Cp 693

1450

ADVANCES IN SMALL MILLETS

Editors

K W RILEY
S C GUPTA
A SEETHARAM
J N MUSHONGA

OXFORD & IBH PUBLISHING CO. PVT. LTD.

New Delhi Bombay Calcutta

ISBN 81-204-0812-0

Published by Mohan Primlani for Oxford & IBH Publishing Co. Pvt. Ltd., 66 Janpath, New Delhi 110 001. Composed by Laserwords, Madras. Processed and printed at Baba Barkha Nath Printers, 26/7 Najafgarh Road Industrial Area, New Delhi 110 015.

1-S3-6

41

SOUTHERN AFRICAN REGIONAL FINGER MILLET IMPROVEMENT PROGRAMME

S.C. Gupta

ABSTRACT

In southern Africa, finger millet (*Eleusine coracana*) (L.) Gaertn.) is widely grown in Tanzania, Zimbabwe, Zambia, and Malwi. The grain is used for food and brewing. It is sold at a higher price than maize in most areas and is consumed beyond its area of cultivation. Even though finger millet is an important cash crop, the area is not expanding and production is not increasing due to the high cost of cultivation and the lack of improved seed.

At the request of Southern African Development Coordinating Conference (SADCC) countries, a regional finger millet breeding programme was started in 1987. A total of 2664 accessions were introduced/collected from Zimbabwe, Zambia, Malawi, Tanzania, Kenya, Uganda, Ethiopia, India, Nepal, and many other countries. These have been evaluated and some of the selected lines have been used in the national and regional programmes. Several varieties are in the advanced yield testing stage in all the four finger millet growing SADCC countries.

The breeding programme is oriented towards the development of early and mid- to late-maturing varieties to meet the needs of the region by following the pedigree and mutation breeding approaches. The parents are selected to recombine such traits as good malting quality, high grain yield, and the good feeding value of the crop residue, in addition to resistance to diseases and lodging. High tillering and tall varieties are selected to reduce the cost of weeding and harvesting.

The mid- to late-maturing varieties are bred in collaboration with the Malawi national programme. The segregating populations are supplied to

breeders for selection for local adaptation.

The selected varieties from either national or regional programmes are jointly evaluated in joint trials with national programmes. In addition to these, a collaborative trial to which all breeders contribute entries is organized on a regional basis. This facilitates movement of breeding material across programmes.

There is close collaboration with the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) Eastern African Programme and an exchange of germplasm with Nepal, India, and the ICRISAT centre in India.

INTRODUCTION

In southern Africa, finger millet is an important crop in Tanzania, Zimbabwe, Zambia, and Malawi. It is also grown in a small acreage in northern Botswana. The total estimated area is around 400,000 ha with an average yield of 500 kg/ha. It is difficult to provide the exact area and production as the statistics combine millets together and in some countries millets with sorghum. Finger millet a highly priced crop wherever it is grown. It is sold at a price three to four times higher than that of maize in many areas and is consumed beyond its area of cultivation. This is bacause the grain is used mainly for brewing and as food for expectant mothers and sick people, and as a delicacy on special occasions. Finger millet can be stored up to 10 years and the farmers prefer to store so that they can sell at a higher price and catch up with inflation. Gupta *et al.* (1989) and Rao *et al.* (1989) have reviewed all information available in SADCC countries on finger millet on varietal development, cultural practices, diseases, insects, processing and utilization. In spite of its importance, both the area and production are declining rather than expanding due to several constraints in production.

CONSTRAINTS IN PRODUCTION

The labour requirement for finger millet is much more than for any other crop. This is mainly due to the cost of weeding and harvesting. In addition, improved varieties which can produce more grain, malt, and good quality crop residue with reduced cost of cultivation are also lacking. In some areas, there are problems of blast (*Pyricularia grisea*), maize streak virus, and stem borer. Drought is a common problem and the late-maturing varieties suffer the most. Finger millet varieties grown in the SADCC countries are of different maturity types and therefore there is a need to breed for different maturity groups.

OBJECTIVES

The SADCC regional finger millet breeding programme executed by ICRISAT was started in 1987 with five objectives: (1) to organize finger millet germplasm collection trips in the SADCC region and to introduce germplasm from all over the world; (2) to evaluate these accessions and make available the selected germplasm to national programmes of Zimbabwe, Zambia, Malawi, and Tanzania; (3) to purify the selected germplasm and evaluate them in collaborative and joint trials in the region; (4) to develop noble genotypes by recombining the desirable traits to meet different needs of the farmers; and (5) to provide training to scientists and technicians in the region.

RESEARCH ACTIVITIES

Germplasm Collection

Germplasm accessions have been collected from Zimbabwe, Malawi, Zambia and Tanzania and introduced from other countries mainly via the Plant Germplasm Quarantine Center, Beltsville, USA; Genetic Resources Unit, ICRISAT centre, India; ICRISAT East African Programme, Kenya; All India Coordinated Small Millets Improvement Project, India; and National Hill Crops Research Programme, Nepal. SADCC finger millet accession numbers i.e. SDFM are assigned to these as our serial numbers which are maintained along with IE, PI and other numbers. The break-up of SDFM numbers country wise is given below:

Zimbabwe: SDFM 1-200, 219-394, 403, 1116, 1118, 1534-36, 1556-1705, 2563-2569. Total 539.

Malawi: SDFM 201-204, 216, 217, 1119-1316, 1708, 2548-2562, 2570-2574. Total 225.

Zambia; SDFM 214, 215, 218, 1113, 1115, 1321-1325, 1707, 1710-1767. Total 69.

Tanzania: SDFM 212, 396, 419, 1064-1068, 1094-1095, 1114, 1117, 1317-1320, 1545-1555. Total 539.

South Africa: SDFM 414. Total 1.

Zaire: SDFM 404-406. Total 3.

Kenya: SDFM 416-418, 1803-2493, 2543-2544. Total 696.

Ethiopia: SDFM 402, 415, 427, 2540-2542. Total 6.

Uganda: SDFM 206, 395, 420-425, 1069-1093, 2545-2547. Total 36.

India: SDFM 205, 207-211, 213, 397-401, 407-413, 426, 428-1063, 1096-1112, 1326-1533, 1537-1544, 1706, 1768-1802, 2494-2539. Total 971.

Nepal: SDFM 2575-2664. Total 90.
SADCC: SDFM 1709, a branching type selection.

Germplasm accessions have been widely collected from Zimbabwe and only from some parts of Zambia and Malawi. Germplasm accessions need to be collected from Tanzania and the northern regions of Malawi and Zambia. the germplasm for useful traits will be introduced on a continual basis.

Germplasm Evaluation

Most of the germplasm accessions have been observed, the selected accessions have been purified and they are being evaluated in yield trials. The germplasm accessions from Zimbabwe and Malawi have been systematically evaluated and the results are presented here.

A total of 322 accessions from Zimbabwe were evaluated at Aisleby (irrigated) during the 1988/89 rainy season and at Henderson (rainfed) during the 1989/90 rainy season. Mean, range and standard deviations for 13 traits are presented in Table 1. The analysis of variance indicated significant variations for time to 50 per cent bloom, plant height, and head shape which were recorded only at Aisleby. In both the locations, there were significant variations for finger length, finger count, grain yield, finger width, seed weight, grain colour and threshing percentage. Variation for number of heads per plant was observed only at Aisleby. The grain yield was positively associated with finger yield and threshing percentage and negatively associated with flowering (Table 2). The data suggest that the high grain yielding lines can be selected on the basis of finger yield and earliness.

A total of 196 accessions from Malawi were evaluated at Aisleby and at two locations in Malawi, Chitedze and Makoka during the 1988/89 rainy season. Data were recorded on time to 50 per cent bloom, plant height, finger length, finger count, finger width, head count, finger yield, grain yield, and threshing percentage in all the three locations, and for blast and head shape at Chitedze, and Makoka, and for seed weight and grain colour only at Aisleby. Mean, range and standard deviations for 13 traits are presented in Table 3. The analysis of variance indicated significant differences for all the 13 traits except for threshing percentage at Chitedze. Grain yield was positively associated with finger yield and threshing percentage (Table 4) as reported in Zimbabwe germplasm. Grain yield was also positively associated with plant height, finger length, head shape,and seed weight in some locations.

These results suggest that a wide range of variation exists in germplasm for several useful traits which can be exploited by selection. There are

TABLE 1

Mean, range and standard deviation for 13 traits at Aisleby and Henderson dunng 1988/89 and 1989/90 rainy seasons respectively

Traits	Locations	Mean	Range	Standard Deviation
Days to 50 per cent bloom	Aisleby	92 44	84 50–125 50	7 664
Plant height (cm)	Aisleby	109 62	85 00–128 50	8 493
Finger length (cm)	Aisleby	5 70	3 00–13 50	1 353
	Henderson	6 08	3 40–9 95	1 151
Finger count per head	Aisleby	8 65	5 50–17 50	1 284
	Henderson	8 02	4 50–13 50	1 319
Head count per plant	Aisleby	10 98	5 50–20 00	2 676
	Henderson	10 92	5 00–19 00	2 507
Finger yield (t/ha)	Aisleby	4 84	2 22–7 00	0 863
	Henderson	1 86	0 58–3 17	0 365
Grain yield (t/ha)	Aisleby	2 99	1 12–4 75	0 625
	Henderson	1 16	0 27–1 96	0 263
Threshing (%)	Aisleby	61 51	35 41–74 29	5 496
	Henderson	62 13	43 33–75 94	6 586
Finger width (mm)	Aisleby	8 87	4 30–12 50	0 988
	Henderson	9 20	6 00–11 50	1 015
Thousand seed weight (g)	Aisleby	2 35	1 70–3 35	0 223
	Henderson	2 45	1 78–3 10	0 233
Grain colour (1–5)	Aisleby	2 84	2 00–5 00	0 619
	Henderson	2 39	2 00–4 00	0 485
Head shape (1–5)	Aisleby	2 20	1 00–3 50	0 350
Blast (1–9)	Aisleby	0 10	0 00–1 50	0 280
	Henderson	0 05	0 00–1 50	0 192

no indications of strong correlations between grain yield and other traits except with finger yield and threshing percentage

COLLABORATIVE YIELD TRIALS

Dunng the 1989/90 rainy season, four collaborative tnals were organized. These were based on maturity (early and late) and the stage of testing (preliminary and advanced). The results of two advanced trials are presented here.

Collaborative Finger Millet Advanced Early-maturing Varieties Trial

A trial of 18 entries including two checks replicated four times was planted at 10 locations. Henderson, Makoholi, Muzarabanı, Gwebi

TABLE 2

Correlation coefficients of grain yield with 12 other traits in finger millet at Aisleby and Henderson during the 1988/89 and 1989/90 rainy seasons respectively

Traits	Aisleby	Henderson
Time to 50% bloom	−0 182 **	—
Plant height	0 014	—
Finger length	−0 033	0 007
Finger count	0 016	0 045
Head count	0 105	0 014
Finger yield	0 903**	0 876**
Blast	−0 072	−0 022
Head shape	0 167 *	—
Finger width	0 056	0 121*
Seed weight	0 092	0 114*
Grain colour	−0 093	−0 053
Threshing	0 554 *	0 513**

Significant at 5 1 and 0 1 percent levels of significance respectively

(Zimbabawe) Mansa Misamfu Mutanda (Zambia), Lambo (Tanzania), Mbawa and Ch tedze (Malawi) In Zimbabwe SDFM 723 produced highest grain yield (2 27 t/ha) which was 24 per cent more over improved check (Table 5) The other selected entries are of Indian origin In Tanzania the highest yielding entry was SDFM 107 (2 83 t/ha) followed by SDFM 264 and SDFM 565 SDFM 723 had many tillers but needs improvement for increased plant height and finger length It is evident from Table 5 that none of the entries was superior to the improved check in Zambia and Malawi in grain yield production

Collaborative Finger Millet Advanced Late-maturing Varieties Trial

A trial of 15 entries including two checks replicated four times was planted at eight locations Aisleby Henderson (Zimbabwe), Mansa, Misamfu Mutanda (Zambia), Makoka Chitedze (Malawi), and Gairo (Tanzania) In Zambia and Malawi the highest-yielding entry was SDFM 217 which was 25 per cent superior to best check in Zambia and slightly superior to check in Malawi (Table 6) The other selected entries are SDFM 1352 in Zambia and SDFM 1708 in Malawi In Tanzania the highest yielding entry was SDFM 1143 with long fingers (103 mm) followed by SDFM 227 Two entries, SDFM 210 and SDFM 1352, had high tillers (16 heads per plant) and SDFM 1352 was also of stay green type None of the late-maturing varieties was superior to the best check in terms of grain yield production in Zimbabwe

TABLE 3

Mean, range, and standard deviations for 13 traits in Malawi finger millet germplasm at Aisleby, Chitedze and Makoka during the 1988/89 rainy season.

Traits	Locations	Mean	Range	Standard deviation
Days to 50 per cent bloom	Aisleby	136.16	86.00-161.00	19.020
	Chitedze	83.15	73.00-98.00	4.945
	Makoka	79.65	68.00-93.00	6.573
Plant height (cm)	Aisleby	101.89	55.50-132.50	10.542
	Chitedze	98.96	72.00-127.50	9.373
	Makoka	88.42	54.50-128.50	122.230
Finger length (cm)	Aisleby	7.41	3.45-16.80	2.407
	Chitedze	6.64	3.30-15.60	2.304
	Makoka	7.78	4.40-17.50	1.900
Finger count per head	Aisleby	8.06	5.65-12.15	1.054
	Chitedze	7.17	4.10-11.80	1.308
	Makoka	8.16	5.00-11.50	1.201
Head count per plant	Aisleby	13.80	8.50-24.50	3.248
	Chitedze	11.80	4.00-25.00	3.907
	Makoka	9.40	5.50-17.50	2.173
Finger yield (t/ha)	Aisleby	2.13	0.27-5.53	0.777
	Chitedze	5.98	0.94-9.69	1.569
	Makoka	3.78	0.26-6.29	1.092
Grain yield (t/ha)	Aisleby	1.17	0.13-3.42	0.499
	Chitedze	3.52	0.44-5.62	0.889
	Makoka	2.28	0.09-4.09	0.760
Threshing (%)	Aisleby	54.46	34.97-69.41	7.280
	Chitedze	59.88	43.33-75.56	6.196
	Makoka	59.23	34.19-72.58	6.606
Finger width (mm)	Aisleby	8.27	6.15-10.15	0.791
	Chitedze	9.87	7.00-15.00	1.437
	Makoka	9.61	7.00-13.50	1.181
Thousand seed weight (g)	Aisleby	2.13	1.23-3.31	0.363
Grain colour (1-5)	Aisleby	2.40	1.00-5.00	0.602
Head shape (1-5)	Chitedze	1.96	1.00-3.50	0.553
	Makoka	2.01	1.00-4.00	0.583
Blast (1-9)	Chitedze	3.04	0.50-7.00	1.384
	Makoka	1.23	0.50-3.00	0.413

Joint Trials in 1990/91

Based on the performance in previous seasons, it was decided to organize the joint trials for Zimbabwe and Malawi into a regional programme.

TABLE 4

Correlation coefficient of grain yield with 12 other traits in finger millet germplasm from Malawi at three locations (Aisleby, Chitedze and Makoka) during the 1988/89 rainy season

Traits	Aisleby	Chitedze	Makoka
Time to 50 per cent bloom	−0.378	0.150	0.058
Plant height	0.021	0.447	0.549
Finger length	0.411	0.079	0.048
Finger count	−0.085	0.267	−0.013
Head count	0.090	−0.142	0.072
Finger yield	0.960	0.883	0.956
Blast	−	0.284	−0.100
Head shape	−	0.144	0.131
Finger width	0.078	0.120	0.061
Seed weight	0.327	−	−
Grain colour	−0.163	−	−
Threshing	0.530	0.166	0.650

Significant at 5, 1 and 0.1 per cent levels of significance respectively

The entries included in these trials are jointly selected on the basis of their performance in previous seasons A trial of 16 entries in Zimbabwe and of 20 entries in Malawi was conducted during the 1990/91 rainy season each at six locations The selected varieties from these trials will be promoted to on farm testing and eventually released to farmers

Collaborative Trial in 1990/91

A collaborative trial with 24 finger millet mid- to late maturing varieties was planted at three to four locations each in Malawi Zambia and Tanzania In this trial the entries were contributed by all the particiapting countries in addition to the regional programme This trial facilitates the exchange of genetic materials among different programmes The selected varieties can move to the joint trials and the national programmes

BREEDING APPROACHES

A breeding programme was begun in 1990 by following pedigree and mutation breeding approaches The progress made so far is described here

Pedigree Breeding

The purpose of Pedigree breeding programme is to combine useful traits such as grain yield malting traits, fodder quality, and resistance to blast The emphasis is also on selecting tall, high tillering and lodging-resistant plants Thirty three accessions were selected for hybridization

TABLE 5

Performance data of collaborative finger millet advanced early-maturing varieties trial entries for grain yield in individual countries and for two morphological traits averaged over locations[a] during the 1989/90 rainy season

Entries	Grain Yield (t ha^{-1})					Days to 50 per cent bloom	Plant height (cm)
	Zimbabwe	Zambia	Malawi	Tanzania	Mean		
SDFM 723	*2.77*	1.83	1.48	2.21	2.17	77.1	67.8
Improved check	*2.22*	2.15	1.80	2.25	2.12	76.0	82.5
SDFM 210	2.11	2.11	1.83	2.42	2.09	78.9	51.7
SDFM 957	*2.33*	2.01	1.59	2.29	2.08	76.9	77.5
SDFM 107	1.92	2.13	1.50	*2.83*	1.99	79.2	71.1
SDFM 1059	*2.34*	1.83	1.19	*2.58*	1.98	75.3	70.0
SDFM 937	2.19	2.15	1.32	1.96	1.98	74.2	80.8
SDFM 1032	1.89	2.09	1.62	*2.62*	1.97	76.4	80.9
Local check	1.73	2.38	1.84	1.67	1.94	79.2	76.8
SDFM 1072	2.07	2.08	1.32	2.25	1.94	76.6	78.7
SDFM 77	1.96	1.99	1.31	2.29	1.87	77.8	76.9
SDFM 241	1.94	1.76	1.42	2.50	1.84	76.1	72.3
SDFM 113	1.96	1.77	1.27	2.54	1.82	79.2	71.6
SDFM 44	2.05	1.57	1.31	2.58	1.81	79.1	75.3
SDFM 1079	1.96	1.79	1.31	1.92	1.78	75.2	78.2
SDFM 264	1.90	1.36	1.59	*2.79*	1.76	79.1	70.0
SDFM 565	1.56	1.75	1.55	*2.71*	1.73	81.7	62.6
SDFM 318	1.93	1.48	1.36	2.33	1.72	79.6	70.8
SE±	0.134	0.196	0.120	0.246	0.086	0.51	1.30
Mean	2.05	1.90	1.48	2.38	1.92	77.6	73.1
CV (%)	26.11	35.60	22.9	20.80	28.47	4.1	11.2

a: Locations: Zimbabwe: Gwebi, Henderson, Makoholi, Muzarabani;
Zambia : Mansa, Misamfu, and Mutanda;
Malawi : Chitedze and Mbawa;
Tanzania: Lambo.

Twelve selections of green node colour were crossed with 21 selections of purple node colour during the 1990 off-season at Muzarabani using "contact method". Purple node colour is dominant over green node colour, so green node colour lines were used as female parents. All the 235 F_1 crosses are being evaluated during the 1990/91 season. The parental lines selected for specific traits are SDFM 77, SDFM 378, SDFM 89, SDFM 416 and SDFM 1017 for high millet diastatic unit; SDFM 63, SDFM 227, SDFM 1708, SDFM 1743, SDFM 217, SDFM 278, SDFM

TABLE 6

Performance data of collaborative finger millet advanced late-maturing varieties trial entries for grain yield in individual countries and for two morphological traits averaged over 7 to 8 locations[a] during the 1989/90 rainy season

Entries	Grain Yield (t/ha)					Days to 50 per cent bloom[b]	Plant height (cm) (%)
	Zimbabwe (2)[c]	Zambia (3)	Malawi (2)	Tanzania (1)	Mean (18)		
SDFM 217	1.16	*3.06*	*1.36*	1.45	1.96	100.1	82.3
Improved check	2.07	2.40	1.31	1.62	1.95	94.0	77.4
SDFM 210	*3.25*	1.56	1.09	1.25	1.83	86.4	52.1
SDFM 1473	2.28	2.01	0.91	1.62	1.76	84.4	62.0
SDFM 1143	2.35	1.61	1.28	*1.98*	1.76	88.6	69.9
SDFM 1708	1.39	2.27	*1.33*	1.62	1.73	94.1	73.8
SDFM 227	2.35	1.26	0.97	*1.96*	1.55	86.6	72.4
SDFM 1352	0.69	*2.52*	0.82	1.65	1.53	88.2	79.2
SDFM 201	1.80	1.65	0.98	1.27	1.47	80.5	71.7
SDFM 396	1.40	1.83	1.01	1.30	1.54	85.7	69.9
SDFM 224	2.05	1.57	0.98	0.79	1.44	81.3	62.2
SDFM 1156	1.43	1.49	1.30	1.37	1.41	97.7	69.2
SDFM 278	2.06	1.23	0.95	0.93	1.33	87.2	61.9
SDFM 1159	1.31	1.35	1.16	1.45	1.31	98.4	71.9
Local check	*3.36*[d]	2.34	1.31	1.44	2.06	93.9	80.0
SE±	0.168	0.147	0.090	0.192	0.076	1.34	1.52
Mean	1.88	1.88	1.12	1.45	1.62	89.8	70.2
C.V. (%)	25.12	27.13	22.86	26.5	26.6	7.9	12.2

a: Locations: Zimbabwe: Aisleby and Herderson;
Zambia : Mansa, Misamfu and Mutanda;
Malawi : Makoka and Chitedze;
Tanzania: Gairo.

b: All locations except Herderson.

c: In parentheses, number of locations are given.

d: Based on one high yielding location only.

1120, SDFM 1143 for white grain colour; SDFM 1352 for stay green type; SDFM 1120 and SDFM 1143 for long fingers; SDFM 1680, SDFM 210, SDFM 723, and PR 404 for high tillering. Some of them have already been used as parents in hybridization programmes.

Mutation Breeding

Ten parents: SDFM63, SDFM 88, and 25C from Zimbabwe; SDFM 1143 from Malawi; SDFM 1072 from Uganda; SDFM 396 from Tanzania;

SDFM 723, SDFM 957, SDFM 1059, and SDFM 1337 from India were selected to induce mutations by physical and chemical mutagens. These lines were treated with five doses of X-rays (10, 20, 30, 40, and 50 Kr) and with five doses of ethyl methane sulphonate (0.2, 0.4, 0 6, 1.0 and 1.5 per cent) in November 1990. The M_1 plants are being grown during this season. The purpose of this study is to find out the effectiveness of each mutagen at different doses and the variation among varieties to the induced mutations for several useful traits.

Promising Varieties in National Programs

The following promising varieties were identified in the national research programmes of Zambia, Zimbabwe, Malawi, and Tanzania.

Zambia

SDFM 1017, ZFM 2316, SDFM 1018, ZFM 8802, GE1409 (multiple resistance to diseases, insects and pests), SDFM 1341, SDFM 1510, SDFM 1944, SDFM 2010, SDFM 2442, SDFM 1746, SDFM 210, SDFM 217, SDFM 1352, 25C, and SDFM 1018.

Four varieties of foxtail millet: Arjuna, RS 118, SIA 326, SIA 2597.

Zimbabwe

SDFM 15, SDFM 27, SDFM 49, SDFM 58, SDFM 77, SDFM 80, SDFM 101, SDFM 103, SDFM 937, SDFM 957, SDFM 1059, SDFM 1400, and SDFM 1337.

Malawi

SDFM 210, SDFM 217, SDFM 1143, SDFM 1156, SDFM 1165, SDFM 1351, SDFM 1708, SDFM 1753, L 122, L 228, L 366, L 516, L 580, L 662, and L 718.

Tanzania

SDFM 107, SDFM 264, SDFM 1700, and SDFM 207 of early-maturing type. SDFM 1143, SDFM 227, SDFM 1734 and SDFM 214 of late-maturing type.

COLLABORATING COUNTRIES, SCIENTISTS, AND ACTIVITIES

Malawi: P.H. Mnyenyembe
Breeding of medium- to late-maturing, high-yielding and disease-resistant varieties of finger millet for food and malt.
Joint Malawi/SADCC finger millet advanced varieties trial.

Zimbabwe: J.N. Mushonga and F.R. Muza
Breeding of early-maturing, high-yielding and disease-resistant varieties of

finger millet for food and malt.
Joint Zimbabwe/SADCC finger millet advanced varieties trial.

Tanzania: H. S. Chambo
Exchange of germplasm.
Collaborative yield trials.

Zambia: B.L. Agrawal
Exchange of germplasm.
Collaborative yield trials.

Kenya (ICRISAT): V. Guiragossian and S.Z. Mukuru
Exchange of germplasm and yield trials.

TRAINING

In-service training is provided to technicians for several weeks in Zimbabwe. On-the-job training is provided to scientists on data analysis and crossing techniques. Training is also provided towards degrees. One student is presently working on "Variability Resulting from Induced Mutations in Finger Millet" with us at Matopos and has taken course work at the University of Nebraska, USA.

WORKSHOPS AND RESEARCH MONITORING TOURS

Regional workshops are organized every year in the third week of September where results of the previous season are discussed and the research plans for the coming season are finalized.

Research monitoring tours are organized in alternate years to visit research programs of different national programmes. Two scientists from each participating countries are invited. This provides an opportunity to the scientists to interact with their colleagues in the field as well as facilitates the exchange of genetic material, among national scientists. The next tour is planned to visit Malawian, Zambian, and Tanzanian programmes during the first fortnight of June 1991. Our colleagues from the East African Programme also participate in such monitoring tours.

FUTURE PROSPECTS

As there is a big demand for grain, and the national programmes in the region are very keen to improve the crop, prospects to expand the research on finger millet seem to be very bright. However, there is a shortage of manpower and training should be an important component of this regional programme.

Once the trained manpower at every level is available, the role of the regional programme will be to generate the genetic variability and the national programmes will be exploiting it for the development of noble varieties acceptable to farmers.

Development of collaborative trials between southern and eastern African countries can be explored for the benefit of these regions. A workshop on finger millet improvement in southern and eastern Africa once in two years can be explored.

REFERENCES

Gupta, S.C., S.A. Rao, and L.R. House, 1989. Finger millet research in the SADCC (southern Africa) region. In: Small Millets in Global Agriculture. A. Seetharam, K.W. Riley and G. Harinarayana. (eds.). New Delhi. India: Oxford and IBH Publishing Co.

Rao, S.A., L.R. House and S.C. Gupta. 1989. Review of sorghum, pearl millet, and finger millet in SADCC countries. SACCAR Botswana and Zimbabwe. SADCC/ICRISAT, pp. 1170.